

We claim:

1. An apparatus for the high pressure electrocoagulative treatment of viscous fluids, including suspensions, emulsions or sludge, the apparatus comprising:

5 (a) An electrocoagulation vessel capable of sustaining elevated pressure, the electrocoagulation vessel having a frame and a plurality of electrocoagulation spacer plates capable of being separated, the frame comprising a head stock, a tail stock, and a plurality of side rails operable to connect to the head stock and to the tail stock, the plurality of electrocoagulation spacer plates being moveably supported by at least one side rail, the vessel including a push plate moveably supported by at least one side rail
10 maintainable in an orientation generally parallel to the electrocoagulation spacer plates when the vessel is in a closed position, the head stock further defining an port capable of allowing fluids to pass out of the electrocoagulation vessel, the plurality of spacer plates further defining a plurality of internal cavities such that, when the spacer plates are brought into contact with each other, the plurality of internal cavities form a
15 cavity chamber;

(b) A plurality of electrodes in contact with at least a portion of the plurality of electrocoagulation spacer plates;

20 (c) An electric conduit including electrical contact terminals being connectable to a power supply and capable of receiving an applied voltage, the electric conduit operable to allow the applied voltage from the power supply to the terminal connections to be applied to at least a portion of the plurality of electrodes, the electrodes capable of contacting the fluid and causing electrical current to flow through the fluid; and

25 (d) Means for moving the plurality of electrocoagulation spacer plates between an open position and a closed position.

2. The apparatus of claim 1 further comprising means for regulating pressure within the electrocoagulation vessel.

3. The apparatus of claim 1 wherein

(a) the electrocoagulation spacer plates further comprise a plurality of gasketed ports on each spacer plates such that, when the spacer plates are in the closed position, the spacer plates define a bore; and

5 (b) wherein the electric conduit further comprises metal inserts at least partially located in the bore such that, when the spacer plates are in the closed position, a plurality of the metal inserts are operable to contact a metal insert in an adjacent position and an electrode.

4. The apparatus of claim 1 wherein the electric conduit further comprising an electrical
10 source operable to apply voltage to at least a portion of the plurality of electrodes, the electrode having an edge of conductive material, at least a portion of the edge of the electrode being operable to receive the applied voltage from the electrical source.

5. The apparatus of claim 4 wherein the electrodes are of sufficient size and shape that at least a portion of the edge is exposed and is operable to be connected to the electrical source
15 external to the frame of the electrocoagulation vessel, such that the electrical source provides electrical current to the electrodes.

6. The apparatus of claim 1 further comprising means for separating solids from the fluid, the means for separating capable of receiving fluid from the effluent ports.

7. The apparatus of claim 6 wherein the means for separating solids from the fluid includes
20 a physical, mechanical or organic separation device to remove solids to produce a treated fluid and separated materials.

8. The apparatus of claim 1 further comprising a collection tank, the collection tank being in fluid connection with the electrocoagulation vessel.

9. The apparatus of claim 1 further comprising a pump operable to transfer viscous fluids
25 through an influent pipe to the electrocoagulation vessel.

10. The apparatus of claim 9 further comprising a riser pipe in connection with the influent pipe, the riser pipe being of a higher elevation than the electrocoagulation vessel, the riser pipe being operable to collect undissolved gas present in the fluid, the undissolved gases collected then being removed from the fluid.
- 5 11. The apparatus of claim 9 further comprising an injection port connected to the influent pipe or the collection chamber prior to the electrocoagulation vessel, the injection port operable to inject chemical reagents into the fluid.
12. The apparatus of claim 1 further comprising a mixing chamber within the electrocoagulation vessel.
- 10 13. The apparatus of claim 1, wherein the means for moving the plurality of electrocoagulation spacer plates between an open position and a closed position is operable to maintain an operating pressure greater than pressure resulting from the influent pump such that the electrocoagulation vessel contains the fluid generally within the cavity chamber.
14. The apparatus of claim 1 wherein the plurality of electrocoagulation spacer plates
15 moveably supported by the side rails include a spacer plate support, the spacer plate support defining a spacer plate slot for positioning and alignment the spacer plates on the side rails.
15. The apparatus of claim 1 wherein an effluent fluid conduit is formed by interconnection of a plurality of gasketed ports in the spacer plates.
16. The apparatus of claim 1 wherein each electrode is a plate that defines an electrode
20 opening operable to allow the flow of fluid through the electrode opening and a fluid path is defined by the electrode openings on successive electrode plates.
17. A method of high pressure electrocoagulative treatment of viscous fluids, including suspensions, emulsions or sludge, the method comprising the steps of :
- (a) Feeding the fluid into an electrocoagulation vessel capable of sustaining elevated
25 pressure, the electrocoagulation vessel having a frame and a plurality of electrocoagulation spacer plates capable of being separated, the frame comprising a head stock, a tail stock, and a plurality of side rails operable to connect to the head

stock and to the tail stock, the plurality of electrocoagulation spacer plates being moveably supported by at least one side rail, the vessel including a push plate moveably supported by at least one side rail maintainable in an orientation generally parallel to the electrocoagulation spacer plates when the vessel is in a closed position, the head stock further defining a port capable of allowing fluids to pass out of the electrocoagulation vessel, the plurality of spacer plates further defining a plurality of internal cavities such that, when the spacer plates are brought into contact with each other, the plurality of internal cavities form a cavity chamber;

(b) Causing the plurality of spacer plates to have a closed position;

(c) Applying a voltage through an electric conduit, the electric conduit including electrical contact terminals being connectable to a power supply and capable of receiving an applied voltage, the electric conduit operable to allow the applied voltage from the power supply to the terminal connections to be applied to at least a portion of the plurality of electrodes, the electrodes capable of contacting the fluid and causing electrical current to flow through the fluid to create a processed fluid;

(d) Removing processed fluid from the electrocoagulation vessel.

18. The method of claim 15 further comprising the step of separating solids from the processed fluid to create a treated fluid and separated material.

19. The method of claim 16 wherein the treated fluid is separated from the separate materials through physical, mechanical or organic separation methods.